

*"If war were declared to-morrow, what would we do for aircraft?"*

# AVIATION

APRIL 30, 1923

Issued Weekly

PRICE 10 CENTS



Dayton Wright "Chummy" Two-Seater fitted as a seaplane

VOLUME  
XIV

## SPECIAL FEATURES

Number  
18

AMERICAN AIRPLANE SPEED RECORDS  
MARTIN-NAVY SHIPBOARD SCOUT SEAPLANE  
PROPOSALS FOR CONTRACT AIR MAIL SERVICES  
DAYTON WRIGHT "CHUMMY" SPORT PLANE DESCRIBED

THE GARDNER, MOFFAT CO., Inc.  
HIGHLAND, N. Y.  
225 FOURTH AVENUE, NEW YORK

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It is only when engineering, production and service are firmly grounded upon experience that the magnitude of Wright Achievement may be realized in its proper perspective.

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WRIGHT AERONAUTICAL CORPORATION  
Ft. Worth, New Jersey, U.S.A.



"The Medallion of  
International Honor"

# WRIGHT

APRIL 30, 1923

# AVIATION

VOL. XIV, NO. 18

Member of the Audit Bureau of Circulations

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NEW YORK



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ness and practicability of such theories.

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# AVIATION

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No. 15

### Economical Engines

**T**HOSE who have entertained doubts regarding the practical value of the extensive gliding experiments Europe has been pursuing during the past two years, may find satisfaction in the news of the successful trials of the Dewoitine "light plane" or low powered airplane.

This remarkable machine is a simple adaptation of the glider with which the French pilot Barbet made an eight and a half hour marauding flight in Algeria some time ago. Fitted with a 7-10 hp. engine this little ship has down its gross weight of 350 lb. at a high speed of 36 m.p.h. has climbed 1500 ft. and has landed at 30 m.p.h. The power required for a cruising speed of 45 m.p.h. is only 55 hp., which comes to say that on flight this machine carries 350 lb. per horsepower as against some 22 to 35 lb. for the ordinary commercial airplane.

These figures sound extraordinary at first sight and their accuracy might be questioned were it not for the fact that M. Dewoitine, the designer of this light plane, is also the constructor of successful high powered airplanes. In an interview given to a French contemporary, M. Dewoitine declared that his light plane is not an attempt to produce an "economic" airplane, but is a hybrid airplane that would not only use low power plant, according to wind conditions. On the contrary, what the French constructor is desirous to prove now that one could obtain through the application of improved aerobics an airplane of immensely superior power economy than his hitherto best believed possible. He points out that such a development, far from being detrimental to producing independent "fresh" machines, will benefit all forms of flying machines, from the low powered sport plane up to the heavily armed plane.

These facts are fully shown, for while the Dewoitine light plane may be too lightly powered for the practical purpose of even a sport machine, it should be remembered that this is but an experimental step with which the constructor already aimed to make a "transition" demonstration. On the other hand, if as a result of these experiments it should become possible to build in a few years efficient commercial airplanes having but one half or even but one third the power loadings of the Dewoitine light plane, they would be so far superior to our present day designs that it would fundamentally solve the whole problem of air transport economies. A commercial airplane that would carry from 15 to 20 lb. of gross load per horsepower would become a paying proposition indeed, for this would mean in the case of Mail III a commercial load of from 5000 to 7000 lb.

Obviously, we are but at the threshold of some very important developments in greater power flight economy. The

disappearance of power with which present day airplanes are pushed through the air for the bulk of more efficient wing curves is one of the problems after effects of the war, while the quickest way to get improved performance was to pile horsepower upon horsepower. Such a course may be justified from the military viewpoint, but the commercial aspect of the question demands a more rational solution.

That the first step in the right direction should have been made in a direct result of experiments with gliding aerobics is a striking illustration of their value for developing better aerobics and aerodynamic construction. Oiling aerobics after successful opportunities for testing still was aerobics under conditions which it is impossible to duplicate in a wind tunnel. Hence no witness the gliding flight competition which the National Aeronautics Association sponsors next summer on the Pacific Coast.

### The National Balloon Race

**T**HIS announcement of the National Balloon Race, to be held this year from Indianapolis July 4, gives promise of different conditions than have applied for many years. The light camera stands will give little chance for record debates but will emphasize the importance of individual skill on the part of the contestants. The usual position, with plenty of room for maneuvering at the start, will be an important asset to the pilot who is trying to hold a sustained course through the varied air currents, at the same time develop fluidness and economy as much as possible in his drifting supply of ballast. Moreover we can expect some very interesting experiences. In fact the whole history of the oldest American division of the air shows us two years to be even recently studied. Perhaps it is this very quality that gives to balloon racing, as the years pass, a constantly increasing vitality. Certain, it is that in spite of the great advance in power driven aircraft (it is perhaps because of it) the first balloon and glider was a stronger presence today than ever before.

From a developed viewpoint, the principal value of ballooning is as a laboratory for training and experience in aerobics, navigation, and aerodynamics. But undoubtedly its strongest appeal lies in the values of pure sport. It is a race to man control of wind, energy and endurance, where the vehicle plays but a minor though necessary part. Else one can forget about horsepower and performance tests. The race is the fun, and the winner is he who can rise to the best advantage the very forces of Nature himself.

We congratulate Indianapolis for introducing all points in the biggest race of its kind ever held in this country.

"If we were declared tomorrow what would we do for strength?"

# Regarding American Airplane Speed Records

Official Statement by Contest Committee of  
National Aeronautic Association of U.S.A.

In connection with the recent speed trials of the Army-Curtis race made by Lieut. E. J. Mackland, A.S. at Dayton, Ohio, AVIATION remarked in the April 9 issue that owing to an apparently erroneous performance, the pilot being directed into the speed course three trials could hardly be contemplated as a world's record.

On the April 23 issue we commented on the strength of a statement (p. 455) issued by the National Aeronautic Association of U.S.A. that Lieutenant Mackland's performance was to be considered as a new world's record for maximum speed. The statement in question, while it did not actually say that the Contest Committee of the U.S.A. had homologated the performance, credited Lieutenant Mackland with having "established a world record of nearly 245 m.p.h." As it seemed incredible that the N.A.A. would officially announce a performance as a world's record unless the Contest Committee had previously homologated it, we presumed that the latter was the case. Now it appears that we were wrong in this presumption, for the Contest Committee did not homologate Lieutenant Mackland's performance, disallowing for claim to a world's record on the ground that the speed trials were not in strict accordance with F.A.I. rules. *Now, AVIATION was right as the first time.*

The statement quoted below which has been issued by the Contest Committee of the U.S.A. sets into matters right. Although the confusion which resulted from a premature announcement is to be regretted, it is gratifying to see directly the Contest Committee adheres to the regulations of the F.A.I. At the same time it is a source of great satisfaction to be able to announce that the Dayton Sprint has recognized the world's maximum speed record "something to remember" with Lieut. E. J. Mackland's splendid performance.—*Editor.*

Lieut. E. J. Mackland, U. S. Army, established a world record of 235.587 m.p.h. in speed trials at Wilbur Wright Field, Dayton, Ohio. His mark of 240.751 km.p.h. over the one kilometer course will stand officially for all time, as this distance of 3,280 ft. was abandoned for speed trials on April 1. Mackland's flight was made March 29.

The airplane was a Curtiss H-5, with Curtiss D-12 motor of 465 hp. Mackland's performance in detail follows:

	Seconds
South bound first flight	30.58
North bound first flight	9.57
	39.95
15.93 divided by 2 gives average	
for two flights over course 9.165 sec., equalling 339.348 km.p.h.	
South bound second flight	10.53
North bound second flight	9.39
	19.92
18.80 divided by 2 gives average	
for two flights over course 9.945 sec., equalling 331.124 km.p.h.	
380.348 and 331.124 divided by 2 gives average speed 355.736 km.p.h. or 239.587 m.p.h.	

## Mackland's Claim Disallowed

The Contest Committee makes this statement: "It has been necessary to disallow the strength made by Lieut. E. J. Mackland, U. S. Army, in view of the fact that he did not maintain horizontal flight over the course as required by the rules and regulations of the Fédération Aéronautique Internationale.

This is deeply regretted by the National Aeronautic Association, for we realize that it was the full intention of Lieutenant Mackland to maintain horizontal flight, and we regret that the regulations make it impossible to accept his speed."

Lieut. Mackland's speed exceeds the record recently made by Staff Lieutenant de France of 232.61 m.p.h. by nearly four miles per hour. Lieutenant Mackland exceeded the Lavoisier record in his two attempts, making a maximum speed of 240.751 km.p.h. over the course. Mackland's maximum speed was at the rate of 435.268 km.p.h. In his dash of 8.27 sec. he attained a speed of approximately 576 miles per minute. Lieutenant Mackland's performance in detail follows:

## Mackland's First Attempt

	Seconds
South bound first flight	16.55
North bound first flight	8.90
	15.98
15.98 divided by 2 gives average	
for two flights over course 8.49 sec., equalling 359.343 km.p.h.	
South bound second flight	13.30
North bound second flight	9.58
	19.97
19.97 divided by 2 gives average	
for two flights over course 8.985 sec., equalling 380.540 km.p.h.	
370.345 and 380.540 divided by 2 gives average speed 375.445 km.p.h.	

## Mackland's Second Attempt

	Seconds
South bound first flight	17.90
North bound first flight	7.90
	15.54
15.54 divided by 2 gives average	
for two flights over course 9.27 sec., equalling 388.345 km.p.h.	
South bound second flight	20.72
North bound second flight	9.03
	15.75
15.75 divided by 2 gives average	
for two flights over course 9.975 sec., equalling 364 km.p.h.	

## Trials of the Remington-Burnelli Airliner

Through the co-operation of the Engineering Division of the Army Air Service the great Remington-Burnelli airliner has been undergoing extensive test flights for the past month at Curtiss Field, Miami, L. I. This ship which was designed for two 400 hp. engines was recently fitted with two Atlantic Gateway motors, and these were well adapted for the work. The Atlantic Gateway motor is of European make before it is a sixty degree "V" type of heavy duty design, with a cylinder displacement of 2608 cu. in., 1080 sq. in. and its weight, including the self starter, is 1520 lb. It develops 400 hp. and so far, in the tests, has proven itself both economical and reliable.

With the exception of the power plant (five foot radius included) the machine stands as originally designed and built with no changes or adjustments. Its controllability and maneuvering qualities, which were adequate with the former temporary installation of two 400 hp. Liberty engines, have been considerably improved through current lengthened balance and higher air speed.

The company's test pilot, Raymond H. Ames with Wilbur P. Stephens as observer, reported that with sixteen persons

348.348 and 345 divided by 2 gives average speed 346.774 km.p.h. or 215.307 m.p.h.

The opening offered for the N.A.A. was Orville Wright, Isaac, Olin A. Porter and L. Lawrence Curtiss, observers, Orville Wright, Leaning Wright, Charles M. Kohn and George R. Smith.

In a letter to Lieutenant Mackland the Contest Committee of the N.A.A. says:

"It is stated by Mr. Orville Wright, who acted as our official representative, that on two trips over the course your flight was not horizontal, as required by the rules. While we realize that this was unintentional on your part and that there was probably no speed gained by the descent condition against you, still it is impossible for us to accept the figures given. Besides as that it is with grave regret that we are forced to disallow your flight."

"You have shown yourself to be one of the greatest high speed pilots in the world, and regardless of our inability to homologate your flight, it will always be felt that you have broken frontiers that only heaven being on earth."

## 500 and 800 Kilometer Speed Records

Lieut. Alexander Penrose, U. S. Army, at Dayton, Ohio, on March 20, made a record of 376.66 km.p.h. over the course of 800 kilometers. This establishes the first record for speed made over the 500 kilometer course, or a distance of 310,686 ft. The record was made in a Virgil-Lippert airplane with Wright motor at 350 hp.

Lieut. R. H. Haven and R. Lockwood, U. S. Army, at Dayton, Ohio, on March 20, are credited with a record of 365.067 km.p.h. over the course of 1,500 kilometers. This record exceeds the record of Roument and Bernard, made in France in June, 1928, who did the distance in 10 hr., 39 min., 45 sec., or more than five hours—Haven and Lockwood's time being 4 hr., 52 min., 35 sec. They flew a Lockheed 4E plane with Liberty motor at 480 hp.

Inasmuch as these flights were made in full accordance with the regulations, they have been situated as official national records and will be submitted by the National Aeronautic Association to the F.A.I. for homologation as official world's records. Existing world's records for the above three trials have been recorded, therefore it is felt that no difficulty will be experienced and that these records will be substantiated.

## CURTIS ENGINE

RESEARCH, DESIGN, AND DEVELOPMENT OFFICE OF U. S. A.  
WASHINGTON, D. C. AUGUST 10, 1932



Lieut. E. J. Mackland standing alongside the Army-Curtis plane on which he made a new world speed record of 235.587 m.p.h. on May 29 at Wilbur Wright Field, Dayton, Ohio

"If we were directed to increase what would we do for aircraft?"

"If we were directed to increase what would we do for aircraft?"

# Contract Air Mail Services Advertised

Post Office Department Asks Bids on Seattle-Victoria and New Orleans-Pilot Town Services

Sealed proposals will be received at the Post Office Department at the City of Washington until 4:30 p. m. on May 25, 1933, for carrying the United States mails on the two routes (hereinafter designated from July 1, 1933) for each subsequent year as the Department may so desire, to June 30, 1934, in safe and suitable aircraft as follows:

## The Two Routes Proposed

1. From Seattle, Washington, to Victoria, British Columbia, about 84 miles, and back, with one stop en route at Vancouver and connecting trans-Pacific mail steamers, but not exceeding an average of twelve round trips a month, for the transportation of mail to amount 680 lb. and to mail a single trip each way, by a suitable satisfactory to the Postmaster General, the contractor to receive the mails at the foot of Bonaville Street and deliver them at Lake Union at Seattle, and to receive and deliver the mails from and to the steamship at Victoria. Bids to state rate per round trip. Round required with bid, \$2,000.

2. From New Orleans, Louisiana, to Philadelphia, Louisiana, about 84 miles, and back, with one stop en route at Houston and connecting Central American and Mexico, Cuba, steamers, and at Philadelphia, or Quantico, with the same steamers, steamers, daily except Sundays and holidays, for the transportation of mail to amount 580 lb. and to mail a single trip each way, by a suitable satisfactory to the Postmaster General, the contractor to receive and deliver the mails at the foot of Canal Street in New Orleans, and to deliver the mails to the steamship at Philadelphia and receive the mails from the steamship at Philadelphia or Quantico. Bids to state rate per round trip. Round required with bid, \$2,000.

Proposals submitted in response to these advertisements will be subject to the Postal Laws and Regulations and to the conditions and requirements set forth in the advertisement to bidders, copies of which, together with blank forms of proposals with accompanying bond, may be obtained from the General Assistant Postmaster General, Post Office Department, Washington, D. C., or from the Postmaster at New Orleans, La. A bid schedule has not been prepared for this. The following is a tentative schedule for proposed route No. 2: leave New Orleans daily except Sundays and holidays not later than 4:00 p. m.; leave Philadelphia or Quantico daily except Sundays and holidays not later than 8:00 a. m.

Decisions as to award of contract will be made as soon as practicable after May 25, 1933, and the selected bidder shall execute the formal contract prescribed by the Department covering service advertised with good and sufficient sureties acceptable to the Postmaster General, and his own contract with the Postmaster General, and to the Postmaster at New Orleans, La. The Postmaster General reserves the right to reject all bids.

The contract may be terminated by Congress, or by the Postmaster General whenever the Government is satisfied that the Postal Service shall be required, in which latter case the contractor shall be allowed, in full indemnity, pay for each number of round trips as said represent the average monthly requirement, provided that such indemnity is not in excess of \$10,000 on the part of the contractor or his agents.

## Post Bidders Should Do

Bidders should state the number of planes it is proposed to provide for carrying the mails on the route (including the number to reserve for each plane in the air), description of planes, showing number of seats, horsepower, speed, cruising miles.

Bidders and their agents are urged to negotiate themselves fully with the laws of Congress relating to contracts for carrying the mails (the more important provisions of which are

referred herein) and to familiarize themselves with requirements set forth in the advertisement and with the service to be performed before they assume any liability as bidders or contractors, so as to prevent misapprehension or cases of complaint therefrom.

Bidders will be required to furnish bank with two or more individual certificates approved by a postmaster of the first, second or third class, which bank need be acceptable to the Postmaster General, and to execute to the Government a contract of indemnity valued above all misadventures at an amount double the amount of the bond received, as a security company which has complied with the provisions of the act approved Aug. 13, 1934, and March 25, 1935. A bid for each satisfactory company may be found on page 60 of the Official Postal Guide for July 1932, a copy of which is furnished each postmaster.

If the accepted bidder fails to file a properly executed formal contract for the service in the Department within thirty days from the date of acceptance of the bid, or having completed the contract fails to provide the service required, he may be declared a failing bidder or contractor and proceedings taken according to law.

Mail requirements for all air mail to be made dependent to the satisfaction of the Post Office Department. The Postmaster General may order an increase of service in weight of mail to be transported or number of trips, with the consent of the contractor, by allowing additional mail to be carried a given rate increase on the contract pay for the mileage as weight increased.

## Important Provisions of Contract

The contract for the service shall contain the following covenants:

The contractor expressly warrants that he has employed as third person in whole or in part, or to be employed in the future, or to cause or to promise the same to be obtained upon compensation in any way anticipated, in whole or in part, upon such person's employment, that he is not a person or persons who are prohibited by law from receiving compensation in pay for any third person, as consideration of such procurement, or in compensation for services as connection therewith, any brokerage, commission, or percentage, and that he is not a person who is prohibited by law from receiving compensation in any other person for services rendered, or supposed to have been rendered, in the procurement of this contract. Further, the contractor and his successors shall execute adequate security for the fulfillment of this contract by the United States, and that the United States may rely on its own use from any cause due or to be deemed due, in order to secure such security, or to cause or to promise the same to be obtained upon compensation in any way anticipated, in whole or in part, upon such person's employment, that he is not a person or persons who are prohibited by law from receiving compensation in pay for any third person, as consideration of such procurement, or in compensation for services as connection therewith, any brokerage, commission, or percentage, and that he is not a person who is prohibited by law from receiving compensation in any other person for services rendered, or supposed to have been rendered, in the procurement of this contract.

No compensation will be allowed for trips not performed. However, pay rate per mile will be allowed for the entire distance between stated points on the route traversed in a partially completed trip, if no delay in the mail over time or best service has resulted.

Reimbursement from pay will be made for carrying the mails to become wet, injured or destroyed, or when a grade of service is rendered inferior to that stipulated in the contract, and for the loss of or deprivation upon any week in the service of the contractor or his agent, provided the loss is occasioned by their fault.

The Postmaster General may annul the contract or require modifications, in his discretion, for repeated failure or for failure to perform service according to contract; for refusing the Postal Laws and Regulations; for disobeying instructions of the Post Office Department; for violating aviation without the consent of the Postmaster General, or assigned or trans-

fering the contract, for combining to prevent others from bidding for the performance of postal service, and such an annulment shall not impair the right of the Department to claim damages from the contractor and his agents.

## No Assignment of Contract

Assignments of contracts or of interests in contracts are forbidden by law, and consequently cannot be allowed. Neither can such an interest in bids be transferred or assigned to other parties. Bidders will therefore take notice that they will be expected to give due the service awarded to them through the whole contract term.

Contractors under this advertisement may be permitted to add other services to contracts awarded by the Postmaster General, and at less than the contract rate of pay.

When a bid is signed by an incorporated company, it should be accompanied in evidence of the authority of the person signing the bid so to sign on behalf of the company. Such

authority must be a certified copy of the proceedings pursuant to which the person was elected or appointed, or authorized as officer or agent of the company and that part of the by-laws showing his authority as such officer or agent to sign the bid, or a certified copy of a resolution of the board of directors or stockholders conferring such authority upon him.

Bids should be for service as stated in the advertisement.

A proposal allowed in any of the several items cannot be used in connection with bids submitted in proper form.

Bids should be forwarded in time to reach the office of the General Assistant Postmaster General not later than 4:30 p. m. of May 15, 1933. Bids received after that time will not be considered in competition with bids received within the prescribed time.

Bids should be sent in sealed envelopes, superscribed "Airmail Proposals" and addressed to the "General Assistant Postmaster General, Washington, D. C."

# The Dayton Wright "Chummy" Sport Plane

Safety and Low Maintenance Cost Principal Features, Valuable for Cross Country Work

Those interested in airplanes from the sportsman's viewpoint will be satisfactorily over a very modern and practical little machine, the "Chummy" designed and developed by Col. V. E. Clark and built by the Dayton Wright Co.

Recently one of the type using the Wright E180 hp. engine, was tested by Army pilots at McCook Field, Ohio, and flown across the Allegheny mountains to Belling Field, Washington, D. C., where it was tested by both Army and Navy pilots, both as a land type and as a seaplane. These tests during which it was flown by more than a hundred different pilots of both services proved conclusively the claims of the manufacturer, so set down in the article.

The Dayton Wright "Chummy" is an ideal sportsman's plane because of characteristics ensuring safety, and because of the other qualities throughout, reducing maintenance cost and ease to a minimum. Its flight and ground characteristics are such that it can be safely brought into, and flown out of, the smallest and roughest fields. Its design features make it particularly "dash-proof." In any sort of stall all controls are perfectly normal and very responsive. A spin is impossible in the service, and there is no danger of a violent

whip-stall, or falling off on a wing, or of tail-shipping. Furthermore, it can be landed in any sort of fashion without danger of stalling over or injury to the machine. It has been described from an article of a *Pittsburgh Post*.

## Safety from Fire Hazard

There is absolutely no gasoline in rear of or in the vicinity of the engine. The entire supply of gasoline is contained in two tanks in the upper wing (giving simple gravity feed) located well to the side of the fuselage. These tanks are guarded by heavy "crash-proof" rubber tubes saving the supply valves are located immediately next to the tanks and are operated by simple remote control with two levers, (one for each tank), located in such position that either occupant can, with a single quick step of the hand in an instinctive direction, (and within any reach), close both valves instantaneously, thereby cutting both tanks and preventing flow of gasoline regardless of how badly the airplane may be wrecked. The air intake to the carburetor leads from the opposite end outside of the engine compartment. The carburetor is drained by a tube leading through the ceiling



Front view of the Dayton Wright Model 27 or "Chummy" sport and training plane. See also front cover illustration.

"If you were declared tomorrow what would we do for service?"

"If you were declared tomorrow what would we do for service?"





## A Shipboard Scout Seaplane: the Martin-Navv

Metal Construction and Small Size Its Chief Features

Tests have just been completed on Lake Erie at Cleveland of the Navy's latest seaplane, the MS1, designed by the Navy for shipboard use and developed by the Glenn L. Martin Company. So far as is known, it is the smallest seaplane ever built.

This machine is entirely built of metal with the exception of the winging. It is 15 ft. in span, 17½ ft. long and 7½ ft. high from the water line. Its actual weight is less than

of any seaplane of its size and it is found to show the plane is a very small space.

Unique in seaplane construction are the floats. These are entirely of duralumin, the structure being built up of channel section beams with solid light-aluminum. The float struts for the bracing struts to be placed diagonally are aluminum alloy castings. Sheet duralumin is used for the float covering. All joints are made water tight by the use of sealing, no-



Two views of the Glenn Martin Model MS1 Navy scout plane for shipboard use. The engine is a 65 hp. Lycoming, Model L-68

650 lb. Notwithstanding its small size, it is a real seaplane, handling and maneuvering in the air as well as upon larger planes. While it is not possible to give actual performance, its speed is quite high, considering that it is a seaplane and that its center of gravity is high.

The power plant is a Lycoming, model L-68, 6 cylinder, air-cooled motor of 65 hp. It carries a 6½ ft. propeller. The motor is mounted on a vertical bulkhead at the end of a fuselage section built up entirely of steel tubing. The method of assembling the fuselage is worthy of special note. It is built in a jig, the various members being held in place by special slings until all the fittings have been made. The result is a perfectly rigid structure which requires practically no truing up. The fittings themselves are quite simple being attached in place by rivet welding. The method, which was developed at the Martin factory, consists of drilling holes through both the main members and the fittings and then welding the material around the ends of the holes. Tests on this type of fitting have shown exceptional strength while it also allows for a minimum of weight.

The pilot's cockpit is roomy and all the controls and instruments are readily accessible. Outside of radio equipment, no auxiliary load is carried.

The tail surfaces and wings are made up entirely of duralumin, channel sections being used largely for the winging, while the ribs are stamped out of the material in one piece. Two-inch tubular duralumin is used for the wing bracing. The leading and trailing edges are of channel duralumin riveted to the ribs. The wings, as well as the fuselage and tail surfaces, are covered with fabric.

The wing structure bracing is accomplished by one set of "H" struts on each side. The flying and landing hooks are taken up by diagonal struts between the front and the outside of the lower wing. The lower wings are attached to the fuselage bracing structure, while the upper wings join at a center section above the fuselage. This arrangement prevents

movement with mainline plus, placed in the joints at the time of riveting.

All interplane and float struts are streamlined with sheet duralumin. The gasoline tank is of welded aluminum and holds twelve gallons—enough fuel for a flight of two hours at full speed.

### Aeronautical Patents

Granted April 3, 1933

- 1,658,431 Landing Indicator for Aircraft. Roger Constant, Seattle, Wash., France.
- 1,658,434 Lever-Controlled Push-Button. Flying Machine, Alexander E. Boney, Chicago, Ill.
- 1,658,437 Landing Gear for Airplanes. Edward W. Bonach, Washington, D. C.
- 1,658,438 Airplane Gun Mounting. John P. Dall, Chicago, Ill.
- 1,658,439 Airplane. Frank R. Veronik, Portland, Ore.
- 1,658,440 Manually Operated Flying Machine. Joseph A. Newell, W. Va., assignor of one-half to Eugene Horvath Kivall, W. Va.
- 1,658,441 Airplane. Gustavus Ben, Singapore, Ore.
- 1,658,442 Stopping and Landing Mechanism for Airplanes. Douglas, Bahamas, and the Lake. James H. Crockett, New York, N. Y.
- 1,658,443 Thruster. Andrew. Henry A. Gault, Chicago, Ill.
- 1,658,444 Method of and Apparatus for Making Propellers. Louis T. Fendley, Williamsburg, Pa., assignor to the Westinghouse Electric & Mfg. Co., a Corporation of Pennsylvania.
- 1,658,445 Propeller and the Like. Ralph H. Hixon, Akron, Ohio, assignor to The Goodyear Tire and Rubber Co., Akron, Ohio.

## The Story of a Remarkable Engine Endurance Test

Wright E4 Engine Powers 300 hr. Test with Full Power

During the past year Lieut. B. G. Lightner, of the Bureau of Aeronautics, Navy Department, has been working steadily to bring about improvements in engines, in order to provide greater durability and reliability.

### The New 300 hr. Test

During the war duration tests were conducted over periods of fifty hours of running. It was a mark of distinction to pass such a test successfully, although the engine was not run at full throttle, the new test looks into five separate periods of ten hours each, and all ordinary adjustments and replacements of minor parts were permitted. Approximately half in post war types received Lieutenant Lightner's test, a longer period of test than fifty hours was required to increase the life of new engine types. Accordingly, specifications were drawn for an endurance test of 300 hr., although the engine was only required to develop about six-tenths of their rated horsepower. As certain types of engines successfully met the test, new specifications were arranged, requiring engines to operate at full rated horsepower and to use standard aviation gasoline.

Some time ago a Wright E4 engine was subjected to the latter test. The test was conducted at Annapolis, under the direct supervision of the Bureau of Aeronautics. It was found that the E4 performed very well up to 125 hr., but at the conclusion of that period of running the valves and valve seats, particularly, and the piston were in bad condition, requiring replacement before continuing the test. In connection with the life of the E4 engine at full throttle, it is interesting to note

nevertheless, the Wright Aeronautical Corp. was developing a new type of cylinder design. This design was first made in the form of a cylinder design. This type, known as T3, and incorporated in that type, Wright's standard engine, the E4, was developed to construct a pair of cylinder blocks of this new type, and again make an effort to meet successfully the Navy's full throttle endurance test. This type engine, which is in current production, is known as type E4 and is the very latest Wright development in the 200 hp. size.

In order to measure the length of life of the engine of the new type, the engine was run at full throttle for 300 hr. and was mounted upon the same engine which had previously run 125 hr. of full throttle as the E4 test. No changes were made in the engine, except the replacement of the E4 cylinder blocks with the E4 type.

### How the E4 Completed the Test

This E4 engine has just completed a successful 300 hr. full throttle test. Certain press dispatches in connection with the completion of the test erroneously stated that the E4 engine had been operated continuously for a period in excess of 300 hr. In a corrected form, not over the last 300 hr. of running were continuous. No involuntary stops were made during the latter period, but several voluntary stops were made, principally to change oils, as the engine was operated on a longer stand with the valve exposed to the weather. Moreover, the very part of this test incorporated certain tests of lubricating oils, and use of two types was made for the purpose of changing oils. However, the engine did operate throughout the 300 hr. period without failure of any part, either major or minor, and the valves and piston were in almost perfect condition at the conclusion. In fact, the engine was going a mile more horsepower at the conclusion than at the beginning of the test. Throughout the run it averaged approximately 300 hp.

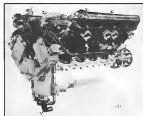
In connection with the engine test inspection disclosed the fact that a ball bearing retainer ring had broken away, and, very probably due to this, one of the crankshaft pins was broken. Neither of these damaged parts, however, interfered with the running of the engine or with its ability to develop its maximum power at the finish.

In the past the history factors of long durability at full throttle have been, generally, valves, pistons and connecting rods. In the E4 type of cylinder construction, it seems that the Wright Company have set up an entirely new standard for these parts. The Wright engineers believe that such of their records as the new standard is being set, and the new type of bronze valve seats, and the use of bearings to the use of Scotch.

### A Long Life Power Plant

Of almost instant to service possibilities of the E4 engine in its comparison to its predecessor, the E2. Under full throttle endurance test, the life of the E4 was apparently 125 hr. more than that of the E2. The E4 engine, under the same conditions. It is a fact that in actual service the E4 may be operated for at least 200 hr. between overhauls, which, of course, includes a much better service life for the E2. The superiority of these improvements for the running plane engine or for mechanical program, as compared with other types, is obvious, and it seems reasonable to believe that the life of the basic parts of the E4 is likely to be some three times that of the plane in which it is mounted.

Wright engineers believe that the results of the test indicate very conclusively that the operating life of the E4 engine, between overhauls, may be extended up to 200 hr. times the life with in the past has been realized with service types of engines.



The Wright E4 300 hp. engine which successfully passed the 300 hr. full power test of the Navy Department

a statement recently given out by Lieutenant Lightner in a paper and before the Washington Section of the Society of Automobile Engineers. The fact is brought out in the paper that the Liberty engine, which is a war development, and by many still considered to be the standard of durability, but an average life of 72 hr. between overhauls, and under substantially the same service conditions. It is, therefore, apparent that, while the E4 was not capable of successfully meeting Lieutenant Lightner's full throttle endurance test, it nevertheless, showed remarkable improvement over war time standards of reliability.

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	3,500 "	30 "	28 "
	4,000 "	35 "	6 "

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